PB87-115036

Asbestos-in-Buildings Technical Bulletin
Abatement of Asbestos-Containing Pipe Insulation

Battelle Columbus Labs., Washington, DC

Prepared for

Environmental Protection Agency, Washington, DC

1986

U.S. Department of Commerce
National Technical Information Service
NTIS

PB87-115036

REPORT DOCUMENTATION PAGE	1. REPORT NO. 1986-2	2.

4. Title and Subtitle
Asbestos-in-Buildings Technical Bulletin
Topic: Abatement of Asbestos-Containing Pipe Insulation

5. Report Date 1986

6.

7. Author(s) Dale L. Keyes

8. Performing Organization Rept. No.

9. Performing Organization Name and Address
Environmental Sciences, 6845 North Cocopas Road
Tucson, Arizona, 85718 under contract to Battelle
Columbus Laboratories, 2030 M Street, N.W., Washington, D.C.

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C) 68-02-4243
(G)

12. Sponsoring Organization Name and Address
Environmental Protection Agency
Office of Toxic Substances
403 M. Street, S.W., Washington, D.C. 20460

13. Type of Report & Period Covered
Technical Bulletin

14.

15. Supplementary Notes
see also PB86-116522,
Guidance for Controlling Asbestos Containing Materials in Buildings.

16. Abstract (Limit: 200 words)

This technical bulletin supplements information in the 1985 guidance document: Guidance for Controlling Asbestos-Containing Materials in Buildings (EPA-560/5-85-024). It addresses one type of ACM: asbestos-containing insulation on steam, hot water, or cold water pipes. Detailed procedures are presented for repairing or removing pipe insulation or removing the insulation and pipe together.

Illustrations

17. Document Analysis a. Descriptors

Pipe Insulation (Types of)
Thermal Insulation
Removal Procedures
Assessing Need for Abatement

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL
INFORMATION SERVICE
SPRINGFIELD, VA. 22161

18. Availability Statement

19. Security Class (This Report)

21. No. of Pages 16

20. Security Class (This Page)

22. Price

United States
Environmental Protection
Agency

Office of
Toxic Substances
Washington, D.C.
TS-798

1986-2

EPA

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INTRODUCTION

In July 1985 the EPA published a revised and updated asbestos guidance document: Guidance for Controlling Asbestos-Containing Materials in Buildings, 1985 Version (EPA-560/5-85-024). The document provides the most recent information on assessing potential exposure to asbestos in buildings with asbestos-containing materials (ACM), and on developing an asbestos control program. It suggests a structured process for identifying ACM, instituting a special operations and maintenance program, determining if additional corrective measures are needed, and, if they are needed, selecting an abatement method.

This technical bulletin supplements information in the 1985 Guidance Document. It addresses one type of ACM: asbestos-containing insulation on steam, hot water, or cold water pipes. Detailed procedures are presented for repairing or removing pipe insulation or removing the insulation and pipe together.

TYPES OF PIPE INSULATION

As discussed in the 1985 Guidance Document, asbestos pipe insulation can take many forms: chalky mixtures of magnesia and asbestos, preformed fibrous wrapping, fiber felt, corrugated paper, and insulating cement. In most cases, the insulation is covered with a hard protective jacket made of cloth, tape, metal, or cement.

ASSESSING THE NEED FOR ABATEMENT

The 1985 Guidance Document outlines a simple process for judging when asbestos-containing pipe insulation needs abatement (repair or removal). A key factor in making these judgments is the condition of the insulation. In general, pipe insulation in good condition with an undamaged jacket will not release fibers; periodic inspection and a special operations and maintenance (O&M) program (see the 1985 Guidance Document, Chapter 3) are all that is needed. Insulation with a deteriorated or damaged jacket should be rewrapped or patched. Where the insulation shows signs of extensive physical or water damage or deterioration, removal and replacement with a nonasbestos insulating material is recommended. Removal and replacement will also eliminate the need to continue the special O&M program. Removal of the pipe and insulation together might be needed where the pipe has deteriorated (for example, due to rusting or scale buildup) or where the building is to be remodeled.

In addition to these guidelines, EPA mandates the removal of asbestos-containing pipe insulation in two situations: when a building is renovated or demolished. Removal is required by the National Emission Standards for Hazardous Air Pollutants (NESHAPS) before building renovation if more than 80 linear meters (about 260 linear feet) of asbestos-containing pipe insulation would be disturbed or made inaccessible. Likewise, NESHAPS requires removal before demolition if the amount of asbestos-containing pipe insulation in the entire buildings is greater than 80 linear meters.

PREPARATION FOR ABATEMENT

Advance Planning and Notification

NESHAPS requires that building owners notify the regional NESHAPS coordinator (and the appropriate state official if regulatory authority has been delegated to the state) before a building with any amount of asbestos-containing material can be renovated or demolished. Notification is also required for renovation projects if more than 80 linear meters of asbestos-containing pipe insulation would be affected. Specified procedures for removal and disposal of the pipe insulation must be followed. [See 10CFR 61, Subpart M (Appendix C in the 1985 Guidance Document) for specific notification and removal requirements.] In addition, the appropriate state regulatory agency should be contacted for information on allowable sites for disposal of the removed material. Some states require a permit before asbestos waste can be placed in a disposal facility.

Worker Training and Protection

Workers involved in the repair or removal of asbestos-containing pipe insulation should be trained and/or experienced in ACM abatement. (See the 1985 Guidance Document, Sections 2.1.1 and 6.1, for information on abatement training programs and for guidelines on selecting abatement contractors.) If levels of airborne fibers are expected to be higher than the current Occupational Safety and Health Administration (OSHA) occupational exposure standards (a strong possibility in most abatement work), OSHA requires that workers wear respirators and protective clothing, and have access to worker decontamination facilities at the work site. The specific type of respirator to be used depends on how high the fiber concentrations are expected to be. As outlined in the 1985 Guidance Document (Section 5.1), EPA recommends that all of these protective measures be employed during every ACM abatement project whether or not fiber concentrations are expected to be above OSHA standards. With respect to

specific types of respirators, EPA recommends that, for maximum protection, only one of the three respirators permitted by OSHA be used: a full-face mask with a self-contained or remote air supply (type "C" respirator). (See Figure 1.) Although half-face masks with replaceable filters are often worn by asbestos abatement workers, they frequently do not seal properly around the face. A single-use, throwaway mask and filter should never be used. An industrial hygienist or health specialist should assist each abatement worker in selecting and fitting a respirator.

The OSHA requirements for abatement workers are published in the Code of Federal Regulations (29 CRF 1910.1001). They are also included as Appendix F in the 1985 EPA Guidance Document (EPA 560/5-85-024). These requirements cover all workers except most state and local government employees. EPA has now extended the OSHA coverage to include all uncovered government workers (see the Federal Register: 50 FR 28530).

Work-site Delineation and Preparation

Work areas should be confined to the smallest possible space and isolated by plastic barriers. Containment prevents fiber dispersal to other areas of the building. The type of containment depends upon the size of the abatement project, on the methods used for abatement, and on the configuration of the space containing the pipes.

Where only small sections of insulation are to be abated, "glove bags" around the insulation may be the most efficient approach to work-site containment. Commercially available containment bags or those fabricated on-site from 6-mil polyethylene plastic are similar to glove boxes used in laboratories for handling hazardous materials (Figure 2). Alternatively, glove bags can be fabricated from 6-mil polyethylene plastic. For use where the temperature is greater than 100°F, glove bags could be lined with heat-resistant materials. All work is done from outside the bag by inserting hands and arms through built-in sleeves. An auxillary sleeve can be used to introduce a nozzle for spraying the insulation before repair or removal. Likewise, a HEPA-filtered vacuum cleaner can be placed through a sleeve in the bag to create a vacuum or negative pressure inside the bag, and to decontaminate and clean all pipe and insulation surfaces. (Specially designed vacuum cleaners with HEPA filters are available commercially.) The bag should be supported from both top and bottom, and a controlled air inlet provided to prevent collapse of the bag if a vacuum system is employed. If a vacuum is not used, seal all sleeves and other openings tightly with sealing tape. All waste should be disposed of through a waste

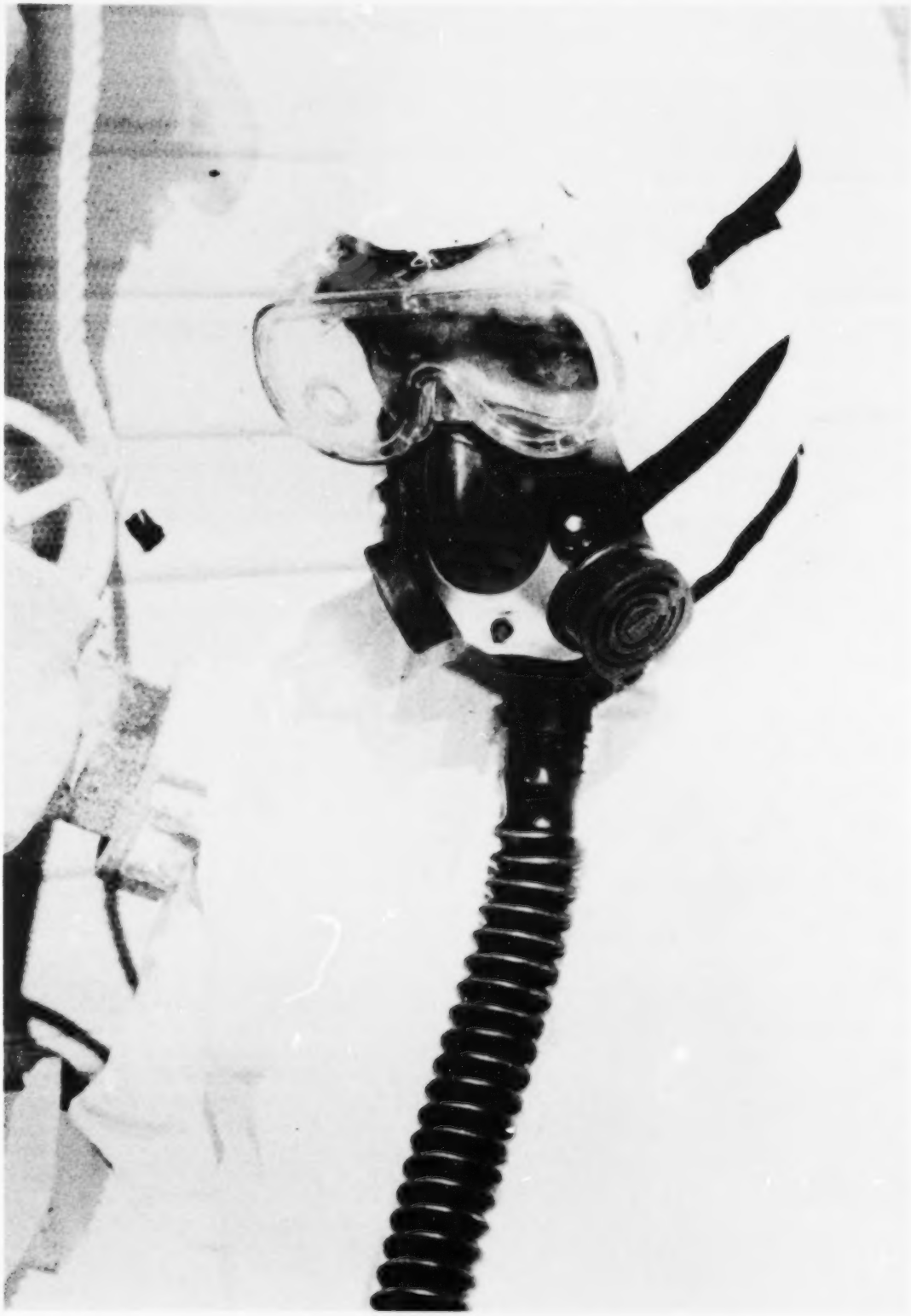

Figure 1. Type "C" respirator.

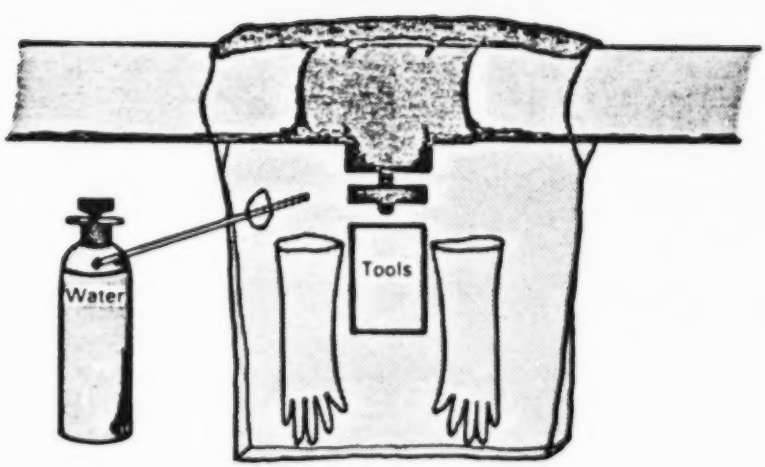

Figure 2. A glove bag.

sleeve, reinforced by a metal or plastic tube, into an attached 6-mil plastic bag. The bag should be labeled "CAUTION: Contains Asbestos -- Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health". Alternatively, the waste can be left in the glove bag and removed together with the bag after abatement is finished. Although work-area containment via a glove bag is designed to isolate abatement workers from the the abatement activity, workers should still wear respirators in case a glove bag should break.

If extensive areas of pipe and/or insulation are to be abated, either large custom-made glove bags should be used, or temporary barriers around the entire pipe network (such as a boiler room) should be constructed and access to adjacent areas strictly limited. All entrances should be posted with warning signs. Barriers should be constructed with 6-mil plastic sheets joined with folded seams and attached to each other and to walls with sealing tape (see the 1985 Guidance Document, Section 5.1). All contained work sites should have a decontamination facility consisting of a dirty change room, a shower, a clean change room, and, if a negative air ventilation system is not used (see below), an air lock.

A negative air system is frequently employed in abatement projects and is recommended by EPA (see Appendix J of the 1985 Guidance Document). In a negative air ventilation system, air is drawn through the decontamination facility into the work area, and is exhausted to the outside of the building after passing through a High Efficiency Particulate Air (HEPA) filter. Low volume fans are used for this purpose. Such a ventilation system draws air slowly into the work area from the rest of the building, thus impeding the release of fibers into the building in the event of a breach in the containment barriers.

MINOR REPAIRS

Minor damage or isolated deterioration of pipe insulation can usually be corrected by plastering the insulation or bare pipe with a nonasbestos mastic compound. (Duct tape is not recommended for other than temporary repairs, since it eventually becomes brittle if exposed to high temperatures.) Damage which is limited to the protective jacket can be repaired by rewrapping the insulation with new material. Consult a local insulation supplier for information on available materials.

Glove bags should be constructed around each section of insulation to be repaired and workers should wear respirators. All materials needed for repairing the

insulation should be placed inside the bag before it is sealed to the pipe. If the use of water is compatable with the repair material (mastic or new wrap), the insulation should be first misted with amended water (see below) from a spray bottle to prevent fiber release. After the repairs are complete, the repaired insulation should be thoroughly cleaned and all waste materials discarded as described below.

REMOVAL OF INSULATION ONLY

Removal Procedures

Inspect the pipe system and determine which sections need to be removed. The project may involve only isolated sections (Figure 3) or much of the entire pipe network. Determine the approximate locations where the insulation should be cut. Cutting at the seams between sections of pre-formed insulation will reduce generation of dust and fibers.

As described above, glove bags are an efficient approach to work-area containment where damage is limited to small sections of insulation. Otherwise, either large, custom-made glove bags must be used or the entire area must be cordoned off with plastic sheet barriers.

Begin the removal operation by spraying areas where the insulation is exposed. The use of water in a misting or fogging spray is required by NESHAPS regulations for all ACM removal work. Water amended with a wetting agent is recommended by EPA (see the 1985 Guidance Document, Section 5.1.1). A mixture of 50 percent polyoxyethylene ester and 50 percent polyoxyethylene ether at a concentration of one ounce per five gallons of water is the recommended agent for all types of asbestos. Unfortunately, this and most other wetting agents will not penetrate ACM with a high content of amosite. However, application of amended water will still result in lower fiber levels in the work site than if the ACM is removed dry. In addition, special permission must be obtained from the Regional EPA NESHAPS coordinator for asbestos to undertake any dry removal of ACM.

Once the insulation has been sprayed, make two full-depth circumferential cuts (where the insulation has been marked) and two longitudinal cuts between them with a knife (Figure 4). Once cut, pry the two halves of insulation apart and slip them off the pipe. During cutting and removal operations, newly exposed insulation should be repeatedly sprayed with amended water to prevent fiber release.

Figure 3. Isolated damage to the pipewrap.

Figure 4. Cutting the insulation.

Removal of heavily damaged or deteriorated insulation may require scraping it with a putty knife. Keep the removed section wet and place the insulation in a 6-mil plastic bag (see Figure 5), seal the bag, and tag it with asbestos warning labels ("CAUTION: Contains Asbestos -- Avoid Opening or Breaking Container. Breathing Asbestos is Hazardous to Your Health"). Placing the empty bags in 55-gallon steel drums or fiberboard barrels will provide added support and protection for the bags as they are filled. As noted above, if a glove bag is used, the removed insulation could be left in the bag, and the bag and insulation discarded together. The bags or drums should be transported to an approved disposal site. The cut ends on the remaining insulation should be sealed with an encapsulating agent to inhibit the release of asbestos fibers. The exposed pipe should be wiped clean of asbestos residue with damp cloths, and the cloths disposed of as asbestos waste.

Replacement of Asbestos Insulation

If the steam, hot water, or cold water distribution system is to remain in operation, the removed insulation should be replaced. Several asbestos-free pipe insulation products are commercially available. Fibrous glass is perhaps the most common replacement material. Note, however, that a thorough work-site cleaning should follow removal and precede insulation replacement, as described below. Removal and replacement of asbestos insulation should be documented immediately in building blueprints and other building records.

REMOVAL OF PIPE AND INSULATION

Removal Procedures

Removal of pipe along with the insulation requires major cutting activities. Glove bags can be used around each location where the pipe is cut, as long as the bags are large enough to accomodate the cutting equipment.

Begin the removal operation by determining the locations where the pipe is to be cut. Keep in mind that the pipe sections must be of manageable size for transporting from the work area. Mark off an 8-12 inch portion of insulation around each of the cutting locations. This insulation will be removed to allow access to the pipe itself.

Where damage to the insulation on the pipe to be removed is isolated, the damaged insulation needs to be wrapped and sealed in 6-mil plastic. If, however, the damage is significant, wrap the entire length of each insulated pipe section (between the cutting locations) in 6-mil plastic and seal at the ends.

Figure 5. Removed section of insulation sealed in plastic.

Remove the insulation around each location where the pipe is to be cut, using the procedures for insulation removal discussed above. Place the two cut halves of insulation in the glove bag or in a labeled 6-mil plastic bag.

After the insulation has been removed, provide a firm support on either side of the cutting locations and along the length of pipe to minimize vibrations. Wood or metal posts can be used for support. The pipe can be cut by hand or with a power saw or a torch. If a torch is used, remove all flammable materials from the work area, and protect nearby areas with a welder's blanket. Nonflammable clothing should be worn by the workers along with disposable protective clothing (Figure 6).

Cut the pipe in the middle of the exposed section. When the cut has cooled, place two 6-mil plastic bags over both ends of pipe created by the cut. Cover at least 6 inches of insulation and firmly tape the plastic in place (Figure 7). Affix asbestos warning labels to the pipe sections. Sections of pipe that have been cut but which will remain part of the heating system should be threaded and capped. The cut ends of insulation on this pipe should be sealed with a nonasbestos mastic.

Pipe sections should be removed from the work site and from the building as soon as is feasible. Workers should continue to wear protective equipment, and care should be taken to avoid damaging plastic coverings. Carrying the pipe by hand is the best way to avoid damage. If reclamation of the pipe is necessary, it should be thoroughly cleaned at this point using procedures described below.

Pipe Reclamation

Reclamation of the pipe is not recommended. However, if pipe sections are to be salvaged, a separate work area should be constructed for removing asbestos insulation from the pipe. Proper worker protection measures should be employed as discussed above. Pipe reclamation facilities are similar to contained work areas for removing pipe and insulation. The work area is surrounded by plastic containment barriers, and an air lock (if negative air ventilation is not employed) and two change areas precede entry into the work area. The size of the work area depends upon the lengths of pipe section to be reclaimed.

During reclamation, pipe sections are moved into the work area through service portals and placed on a work table. Insulation is cut and removed as described above. Again, wetting the insulation with a misting spray is necessary. The wet insulation is immediately placed in a 6-mil labeled plastic bag. The bags are sealed and removed.

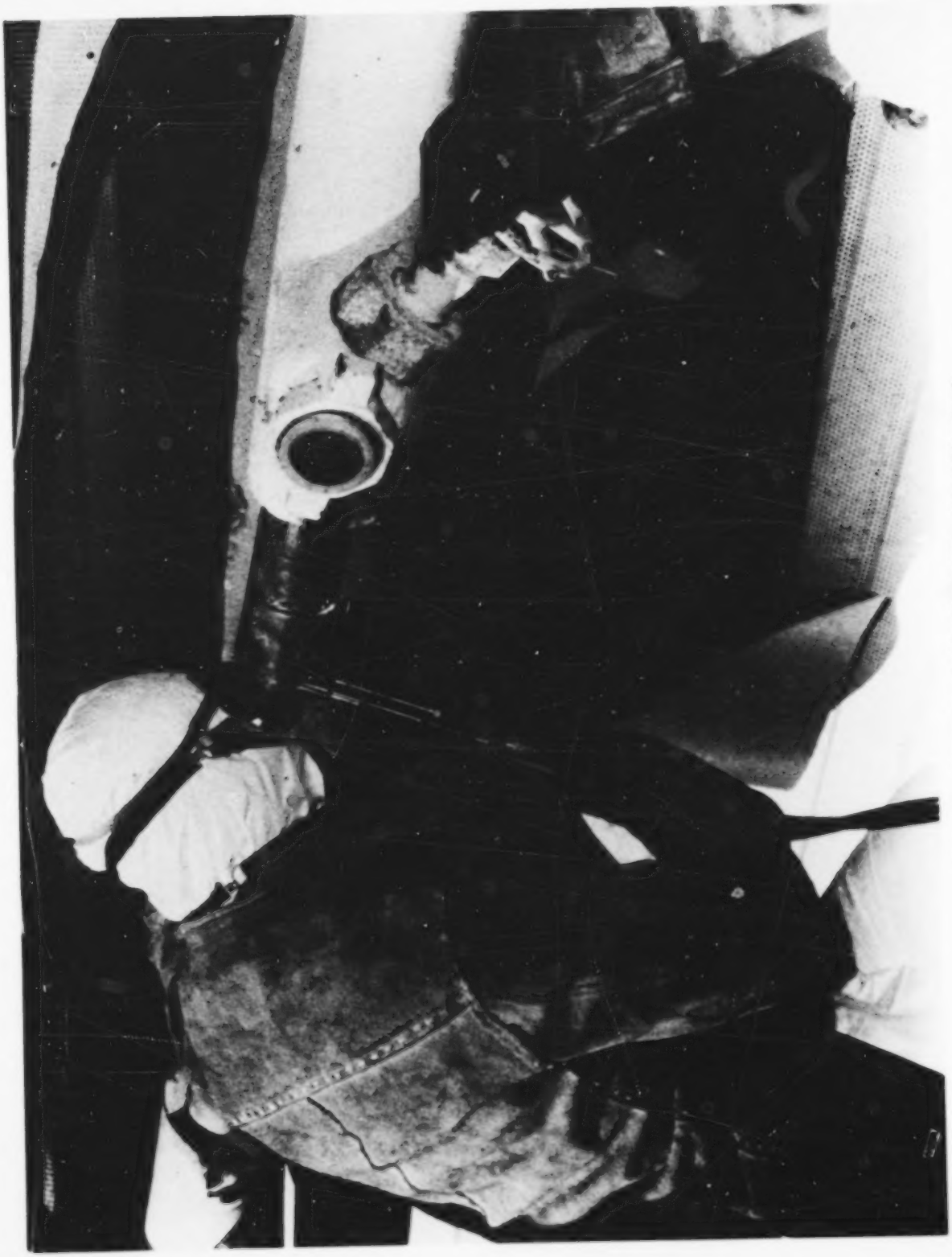

Figure 6. Protective clothing for cutting pipe with a torch.

Figure 7. Ends of cut pipe covered with plastic.

Cleanup and inspection should be performed following the procedures discussed below.

WORK-SITE CLEANUP

If a glove bag were used for insulation repair or removal, carefully remove all debris from the outside of the bag while it is still attached to the pipe. Next, spray the inside of the bag with amended water to wash all visible dust to the bottom of the bag, paying special attention to the waste service sleeve (if used). If tools used in the repair or removal are to be reused, they should be sprayed to remove all debris, and placed in the tool pouch. The pouch should be twisted, tied off at the twist, and cut from its attachment to the bag. The pouch should then be removed from the glove bag by pulling it out through the glove hole, reversing the sleeve in the process. At this point, the pouch will be inside the reversed sleeve. Twist, tie off, and cut the sleeve to free the tool pouch. Next, collapse the bag using the HEPA vacuum, and remove the vacuum wand from its entry hole. The entry hole should be sealed with duct tape. Finally, the waste bag should be detached and sealed, and the service hole taped shut. The glove bag can now be carefully removed from the pipe. Dispose of the glove bag and waste bag as asbestos waste.

If a torch was used for cutting pipe, vacuum the welder's blanket with HEPA-filtered equipment or wipe it clean with a damp cloth. Carefully roll up the welder's blanket and remove it from the work area.

Finally, the entire work area should be thoroughly cleaned. This is especially important if a glove bag was not used. All walls, floors, and ceilings should be vacuumed using a HEPA-filtered vacuum cleaner, or wiped with damp cloths and mops. Asbestos-contaminated dirt floors in steam trenches or tunnels should be cleaned up by spraying them with amended water and removing the top 1-2 inches of soil. Contaminated soil should be placed in 6-mil plastic bags, labeled as described above, and disposed of as asbestos waste. All shovels and other equipment used to remove soil should be cleaned with damp cloths, and all cloths and mopheads used in any part of the cleanup operation should be disposed of as asbestos waste.

FINAL INSPECTION

A final inspection is needed to determine if the work site has been cleaned properly. Only after such determinations have been made should the containment barriers and warning signs be removed. If the removal were limited to just a few sections of pipe and/or insulation and glove bags were used for containment, an inspection of the entire worksite is

normally not necessary, unless ACM escaped from glove bags or waste containers during abatement activities.

The final inspection should include both a visible examination of the site and, for large abatement projects, air testing for asbestos. The 1985 Guidance Document recommends that air samples be analyzed by either optical microscopy to measure total airborne fibers as an index of generalized contamination at the work site, or by transmission electron microscopy as a specific measure of airborne asbestos. Guidelines for conducting the air tests and for interpreting the result are summarized in the 1985 Guidance Document and are described in more detail in a companion EPA guidance document: Guidance for Controlling Asbestos-Containing Materials in Buildings (EPA 560/5-85-024).

ADDITIONAL ASSISTANCE

Additional assistance can be obtained from your Regional Asbestos Coordinator and your NESAP contact. The telephone numbers are listed below:

Region I		Region VI	
RAC	(617) 223-0585	RAC	(214) 767-5314
NESHAP	(617) 223-4872	NESHAP	(214) 767-9835
Region II		Region VII	
RAC	(201) 321-6668	RAC	(913) 236-2835
NESHAP	(212) 264-4479	NESHAP	(913) 236-2896
Region III		Region VIII	
RAC	(215) 597-9859	RAC	(303) 293-1742
NESHAP	(215) 597-9393	NESHAP	(303) 293-1767
Region IV		Region IX	
RAC	(404) 881-3864	RAC	(415) 974-8588
NESHAP	(404) 881-4298	NESHAP	(415) 974-7633
Region V		Region X	
RAC	(312) 886-6006	RAC	(206) 442-2870
NESHAP	(312) 886-6793	NESHAP	(206) 442-5810

Copies of the 1985 Guidance Document cited here can be obtained by calling, toll free: 800-424-9065 (554-1404 in Washington, D.C.).